Examination of Disproportionality of Autism in School-Aged Populations in the U.S.

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Abstract

The purpose of this article is to examine the disproportionality among racial/ethnic groups and states for the disability category of "Autism" as reported to the U.S. Department of Education's Office of Special Education Programs (OSEP). Over the past decade, a variety of sources indicated a dramatic increase in the number of students receiving special education services under this category. In this article, statewide variations amongst each of the racial/ethnic groups are explored along with a discussion of possible reasons for these variations.

Autism has become the subject of much discussion internationally, with increased media and public attention raising a series of questions in the USA and around the world. There has been an increase in prevalence of children being diagnosed with Autism, along with an increase in students enrolled in public schools receiving special education services under the Autism category. Recent estimates indicate prevalence rates ranging from 1 in 74 and 1 in 554 ("The Johnson Center for Child Health and Development," 2012). Yet, these prevalence rates in the USA vary by race/ethnicity, and questions regarding the low prevalence rates amongst Hispanic populations have been raised (Palmer, Walker, Mandell, Bayles, & Miller, 2010). Underlying these questions is whether Autism has assumed a rather *privileged* position, since unlike the disability category of Emotional Disturbance or Intellectual Disability where a low prevalence is viewed as positive, a low prevalence for Autism could be viewed as negative, and a source for concern if certain resource benefits are connected to having a diagnosis of Autism. Durkin et al. (2010) completed an analysis of data from the Autism and Developmental Disabilities Monitoring Network, and found that socio-economic status (SES) was a significant factor associated with higher prevalence rates of Autism diagnosis, leading them to speculate whether "socioeconomic inequality" resulted in disparities with access to services. These questions gave rise to the current examination of trends in prevalence of Autism amongst the various race/ethnic groups in the USA. The question of rising prevalence as a result of shifting diagnostic categories (e.g., National Research Council, 2001) and disproportional assignment of students to an Autism label on the basis of race/ethnicity (Mandell et al., 2009) have also been raised.

Autism is recognizable and a diagnosis of Autism is based on the characteristics listed in the *DSM-IV-TR* and upcoming *DSM-V* (American Psychiatric Association, 2000). Recent advances in diagnostic tools have resulted in a variety of special diagnostic tools to more accurately identify children with this condition.

Historically, Autism was considered a heart-breaking childhood disorder and was referred to as "childhood schizophrenia" and "autistic psychopathy" (Feinstein, 2010). When Bruno Bettleheim (1967) coined the phrase "Refrigerator Mothers," he perpetuated the psychodynamic theory that Autism was caused by parenting practices of upper middle class mothers who lacked nurturing qualities. Kanner (as cited in Feinstein, 2010) noted that parents of children with autism tended to be "strongly preoccupied with abstractions of scientific, literary, or artistic nature, and limited in genuine interest in people" (p. 250). This view of Autism began a period of time in which treatment for children diagnosed with Autism consisted of removing them from their mothers and assisting them with overcoming the negative effects of poor parenting.

Significant research attention has been focused on understanding the causes of Autism. It is now well-accepted that Autism is not caused by poor parenting. It is now understood that Autism is a complex neurodevelopmental disorder for which there are many causes (National Research Council, 2001). Although, theories regarding the cause of Autism continue to be a source of debate, there is a general consensus that Autism is likely caused by a combination of both genetic and environmental factors.

Although questions regarding causation will continue as we attempt to gain a greater understanding of Autism, there is an increasing interest in understanding specific questions regarding the increased prevalence and what

could be contributing to the variations in prevalence across geographic and demographic groups. The National Research Council's (2001) report found that:

> Studies reporting much higher rates were from relatively small samples or from state surveys, in which an educational label of Autism was associated with provision of intensive services and thus highlight the need for further, well-designed investigations. For example, the [U.S.] Department of Education's Office of Special Education Programs (OSEP) could support a research study examining the prevalence and incidence of Autism, using OSEP data gathered for school-age children since the Autism category was recognized in 1991. (p. 25)

Research Questions

The purpose of this research was to examine publicly available data in the USA to see whether disproportionality for Autism is substantiated and to explore possible factors that may contribute to it. The questions guiding our data analysis were:

1. To what extent is there disproportionality of Autism across states in the USA? How has this changed over the years?
2. For which racial/ethnic groups is disproportionality of Autism the greatest (either over- or under-represented)? How has this changed over the years?
3. What are the features of the states in which there is greater disproportionality of Autism?

Method

In order to examine statewide variations in the number of students receiving special education services under the category of Autism, we examined data available on the U.S. Department of Education website (Data Accountability Center, 2008). This website includes data by disability category since 1998, and at the time of this report, the most recent data available was for 2008. The data sets for students ages 6 to 21 years were used for our analysis, since many states classify children below this age under the Developmental Delay category. We also examined Ahearn's 2010 National Association for State Directors of Special Education (NASDSE) report on funding for special education, (Ahearn, 2010). This report includes funding formulas for allocating resources to fund special education services in each state and whether there were explicit funding criteria for Autism. We determined a state had a funding incentive to label students with Autism if a student in that state received additional funding, such as additional weighting factors as multipliers to the base per pupil funding. Lastly, we examined the Easter Seals reports on statewide initiatives on Autism, ("State Autism Profiles," 2012). We read the descriptions of activities in each state to determine if a state was pursuing any initiatives related to Autism, such as statewide conferences, university centers, or other activities. For all data sets, we did not include Puerto Rico, District of Columbia, or Bureau of Indian Education (BIE) schools.

The "Risk Ratio"

We conducted an analysis of risk ratios for each race/ethnic group under the Autism category for all years between 1998 and 2008. The risk ratio developed by Westat is a common method used by most states to determine disproportionality (Bollmer, Bethel, Garrison-Mogren, & Brauen, 2007). Essentially, the risk ratio is calculated by dividing the percentage of students from a certain ethnic/racial group within a specific category by the percentage of students who are within that ethnic/racial group in the general population. For example, to calculate the risk ratio for Asian students who have the label of Autism, one would divide the percentage of students who are Asian within the category of Autism by the percentage of Asian students in the general population. This ratio indicates whether the percentage of Asians in the category of Autism is higher than would be expected. A score of "1" would actually mean that there is no risk, hence no overrepresentation, and the higher the number, the higher the risk or the higher the amount of overrepresentation. As the risk ratio approaches "0", a low risk is indicated, meaning underrepresentation.

Results

In this section, we report on the results based on organizing the various data sources. The data and analyses are organized to first address the question of the extent of disproportionality across states; disproportionality of Autism based on race/ethnicity; and finally an examination of disproportionality within states that had greater disproportionality.

Trends in Disproportionality

Table 1 lists the U.S. Department of Education's 1998 and 2008 reported prevalence of students by race/ethnicity who received special education services under the category of Autism. In total, there has been an increase from 53,874 students in 1998 to 273,975 students in 2008 (an increase of 220,101 students, or 509%). However, the amount of increase varied

Table 1

Changes in Prevalence of Students Receiving Special Education Services Under the Autism Category, Ages 6-21, by Race/Ethnicity (1998, 2008)

	American Indian / Alaska Native	Asian / Pacific Islander	Black (not Hispanic)	Hispanic	White (not Hispanic)	U.S. Average
1998 Prevalence (Per 10,000)	5	10	11	5.2	8.4	
2008 Prevalence (Per 10,000)	35	54	39	29	45	
Percentage Increase	604%	598%	345%	741%	520%	509%

across race/ethnicity. The largest increase was amongst Hispanic and American Indian/Alaska Native groups (741% and 604%), and the smallest increase was amongst Black students (345%).

Interestingly, in 1998, Autism prevalence was highest amongst Asian/Pacific Islander (1 in 986) and Black (1 in 830) and lowest amongst American Indian/Alaska Native (1 in 1,872) and Hispanic (1 in 1,879). In 2008, prevalence rates were highest amongst Asian/Pacific Islander (1 in 186) and White (1 in 221) and lowest amongst Hispanic (1 in 342). Furthermore, in 2008 prevalence rates amongst White, Black, and American Indian/Alaska Native groups were somewhat similar (1 in 221, 255, and 288, respectively).

Table 2 lists the calculated risk ratio for each race/ethnic group by state, along with the overall prevalence rates per 10,000 individuals, the percentage of special education students who received Individual with Disabilities Education Act (IDEA) services under the Autism category, and whether or not a funding incentive existed for an educational label of Autism in that state. Risk ratios indicating an over-representation (a score higher than 1.5) is indicated with a double asterisk; risk ratios indicating under-representation (a score lower than .5) is indicated with a single asterisk. As can be seen, percentages of students receiving IDEA services under the Autism category vary from as low as 1% (Iowa) to as high as 10% (Minnesota). The average for the U.S. in 2008 was 5%.

Table 3 lists the number of states in which the risk ratio for each race/ethnic group was low (less than .5, indicating underrepresentation) and the number of states in which the risk ratio was high (greater than 1.5) for 2004 and 2008 (note: 2004 is the earliest year in which data is available to calculate risk ratios using OSEP data). As can be seen in Table 3, none of the states' risk ratios indicated overrepresentation for Hispanic students in either 2004 or 2008. However, for both years, there were a number of states in which there was under-representation of Hispanic students (22 and 13 states, respectively). For both years, the highest number of states that indicated over-representation (risk ratio over 1.5) was amongst Asian/Pacific Islander (7 and 10 states, respectively) and White students (13 and 7 states, respectively). The fewest number of states for which there was under-representation was for Asian/Pacific Islander (1 and 0, respectively) and Black students (0 and 1, respectively); and no state had under-representation for White students for either year. For U.S. totals, there was neither over nor under-representation amongst any ethnic/race group.

Table 2

Risk Ratios, Prevalence, Percentage of IDEA students in Autism category, and Presence of funding Incentives for Autism by Race/Ethnicity and State (Fall 2008)

State	American Indian/ Alaska Native	Asian/ Pacific Islander	Black (not Hispanic)	Hispanic	White (not Hispanic)	Prevalence (per 10,000)	% Students receiving IDEA services under Autism category	Funding Incentive for Autism?
Alabama	1.53**	1.08	0.99	0.54	1.06	4	4%	No
Alaska	--	--	--	--	--	4	--	No
Arizona	0.49*	1.61**	1.36	0.48*	1.90**	6	5%	Yes
Arkansas	1.07	1.39	0.65	0.52	1.63**	5	4%	No
California	1.10	1.45	1.23	0.52	1.49	7	7%	No
Colorado	0.98	1.18	1.10	0.42*	1.85**	3	3%	Yes
Connecticut	1.30	1.14	1.07	0.64	1.20	9	7%	No
Delaware	--	1.57**	1.08	--	1.11	4	4%	No
Florida	0.65	1.33	0.81	1.13	1.02	5	4%	No
Georgia	0.52	1.36	1.01	0.57	1.12	6	5%	No
Hawaii	1.67**	1.62**	0.48*	0.25*	1.00	4	6%	No
Idaho	0.87	1.83**	0.98	0.42*	1.77**	5	6%	No
Illinois	1.14	1.26	0.92	0.56	1.40	6	4%	No
Indiana	0.57	0.84	0.77	0.42*	1.61**	9	6%	Yes
Iowa	--	--	2.71**	1.13	0.62	2	1%	No
Kansas	1.36	1.62**	1.31	0.57	1.07	4	3%	No
Kentucky	--	1.26	1.11	--	1.06	4	3%	Yes
Louisiana	0.33*	1.27	1.03	0.49*	1.05	3	3%	No
Maine	1.09	0.73	0.88	0.58	1.31	13	6%	No
Maryland	0.88	1.28	1.03	0.67	1.02	8	7%	No
Massachusetts	--	--	--	--	--	8	--	No

(Continued)

Table 2 (Continued)

State	American Indian/ Alaska Native	Asian/ Pacific Islander	Black (not Hispanic)	Hispanic	White (not Hispanic)	Prevalence (per 10,000)	% Students receiving IDEA services under Autism category	Funding Incentive for Autism?
Michigan	1.26	0.91	0.78	0.44*	1.44	7	6%	No
Minnesota	0.92	0.91	1.11	0.58	1.17	14	10%	No
Mississippi	0.70	1.24	1.01	0.57	1.04	3	2%	No
Missouri	1.05	1.68**	1.05	0.48*	1.04	6	5%	No
Montana	0.74	1.99**	--	--	1.48	3	3%	No
Nebraska	0.57	1.39	1.03	0.58	1.31	4	4%	No
Nevada	1.20	1.70**	1.17	0.50	1.41	7	6%	No
New Hampshire	1.57**	0.85	0.71	0.47*	1.55**	7	4%	No
New Jersey	--	--	--	--	--	8	--	No
New Mexico	0.52	1.87**	1.03	0.48*	2.49**	3	2%	No
New York	1.49	0.75	1.02	0.72	1.26	6	4%	No
North Carolina	0.38*	1.13	1.14	0.47*	1.12	7	5%	No
North Dakota	0.43*	1.59**	2.20**	0.71	1.33	3	4%	No
Ohio	1.12	1.00	0.82	0.47*	1.32	6	5%	Yes
Oklahoma	1.26	1.26	0.88	0.41*	1.22	5	3%	Yes
Oregon	1.63**	1.14	1.10	0.50	1.41	13	9%	No
Pennsylvania	1.17	0.96	0.93	0.69	1.19	8	5%	No
Rhode Island	0.80	1.00	1.00	1.00	1.00	9	5%	No
South Carolina	--	--	1.00	1.00	1.00	5	3%	Yes
South Dakota	0.67	1.00	1.00	1.00	1.00	5	4%	Yes
Tennessee	--	--	1.00	1.00	1.00	4	4%	No

(continued)

Table 2 (continued)

State	American Indian/ Alaska Native	Asian/ Pacific Islander	Black (not Hispanic)	Hispanic	White (not Hispanic)	Prevalence (per 10,000)	% Students receiving IDEA services under Autism category	Funding Incentive for Autism?
Texas	1.10	1.00	1.00	1.00	1.00	5	5%	No
Utah	0.57	1.00	1.00	1.00	1.00	5	5%	No
Vermont	--	--	--	--	--	--	--	No
Virginia	0.90	1.00	1.00	1.00	1.00	7	5%	No
Washington	0.91	1.00	1.00	1.00	1.00	6	6%	No
West Virginia	0.00*	1.00	1.00	1.00	1.00	5	3%	No
Wisconsin	1.32	1.00	1.00	1.00	1.00	8	6%	No
Wyoming	0.60	1.01	1.00	1.00	1.00	6	4%	No
U.S.	0.84	1.00	1.00	1.00	1.00	6	5%	N/A

**Indicates Risk Ratio > 1.50 (over-representation)
*Indicates Risk Ratio < .50 (under-representation)
--Indicates missing data

State Features

Based on the U.S. average prevalence of 6 per 10,000 individuals in 2008, we grouped states according to high, average, and low prevalence states based on the following criteria: a) high prevalence states would be those that had 8 or more students per 10,000; b) average prevalence states would be those with 4 to 7 individuals10,000; and c) low prevalence states would be those with 3 individuals or less per 10,000. Upon examining the data presented in Table 2, and using the criteria for high and low prevalence, the following five states were considered to be high prevalence states: Connecticut, Indiana, Maine, Minnesota, Oregon, and Rhode Island. The following seven states were considered to be low prevalence states: Iowa, Colorado, Louisiana, Mississippi, Montana, New Mexico, and North Dakota. Looking at Table 2, we also identified states that had high percentages of IDEA-served students with autism based on 2008 OSEP data. Minnesota had the highest at 10%, Oregon had the second highest at 9%, and the following states had 7%: California, Connecticut, and Maryland. The following states had the lowest percentages: Iowa had 1%, Mississippi had 2%, and New Mexico had 2%. Characteristics for each of these states are listed in Table 4.

As can be seen in Table 4, Indiana was the only high prevalence state that showed under-representation for Hispanic and over-representation for White students. Oregon had a high prevalence rate and showed over-representation for American Indian/Alaska Native students (one of only four states that showed over-representation for this group). Of the four states with high prevalence of Autism, only one (Indiana) had a funding incentive (defined here as increased per pupil expenditure) for an Autism diagnosis.

Among the seven states in which there was a low prevalence of Autism (3 or fewer individuals per 10,000), all except one (Mississippi) showed risk ratios that indicated either over- or under-representation for at least one race/ethnic group. Three out of the seven states (New Mexico, Colorado, and Louisiana) showed under-representation amongst Hispanic students; two states (Louisiana and North Dakota) showed under-representation for Native American/Alaska Native; three (Montana, New Mexico, and North Dakota) showed over-representation for Asian/Pacific Islander; and two states (Colorado and New Mexico) showed over-representation amongst White students. In fact, New Mexico's risk ratio score for White (not Hispanic) students was the highest amongst the states at 2.49. Among these low prevalence states, Colorado was the only state that had a funding incentive for Autism. Interestingly, Colorado (like Indiana) also showed high disproportionality amongst White and low disproportionality amongst Hispanic students.

The only two states in which there was over-representation of Autism amongst Black students were the states in which prevalence rates for Autism were extremely low (Iowa and North Dakota). None of the high prevalence states showed under-representation for any ethnic/race group except for Indiana, which showed under-representation amongst Hispanics. Amongst low prevalence states, the disproportionality amongst groups was mixed.

States with average prevalence rates (4 to 7 individuals per 10,000) were among the most likely to have funding incentives for Autism. Six out of eight states with funding incentives fell within this group (Arizona, Kentucky, Ohio, Oklahoma, South Carolina, and South Dakota). These states also showed a mixed picture in terms of disproportionality, ranging from none (South Carolina and South Dakota) to over-representation amongst three or more race/ethnic groups (Arizona, Hawaii, and Idaho).

Examination of Disproportionality within Specific States

For this section, we chose to more closely examine individual statewide initiatives and policies that could potentially have a bearing on the degree of disproportionality amongst race/ethnicity. We examined states to see which states showed disproportionality among the most number of race/ethnic groups and those that showed no disproportionality. After studying Table 2, one can see that 23 states had no categories in which there was over- or under-representation. Amongst these states several had very low disproportionality scores of +/- 0.1 from 1: South Carolina, Tennessee, Texas, Virginia, and Washington. Six states had three or more categories of over-representation: Arizona, Hawaii, Idaho, New Hampshire, New Mexico, and North Dakota. We decided to take a closer look at four of the states that had varying risk-ratios to examine features of these states which might have contributed to their differing risk-ratios. We chose Texas and Virginia, because these two states had no disproportionality and had data reported for all five race/ethnic groups; and we chose Arizona and Hawaii because these two states showed disproportionality amongst four out of the five race/ethnic groups.

Texas. Texas (a state with no disproportionality) is a large population state similar to national averages (within +/- ten percentage points), although there were over twice as many Hispanics residing in Texas than the

Table 3

Number of States in Which IDEA-served Students Ages 6 Through 21 Are Over- or Under-Represented in the Autism Category (2004, 2008)

	American Indian/ Alaska Native		Asian/ Pacific Islander		Black (not Hispanic)		Hispanic		White (not Hispanic)	
YEAR	2004	2008	2004	2008	2004	2008	2004	2008	2004	2008
Risk Ratio > 1.5 (over-represented)	2	4	7	10	5	2	0	0	13	7
Risk Ratio < .5 (under-represented)	5	5	1	0	0	1	22	13	0	0
Total States with Disproportionality	7	9	8	10	5	3	22	13	13	7

national average (US Census Bureau, 2010). Texas also had a moderate prevalence of Autism (5 individuals per 10,000) and 5% of students receiving IDEA services received services under the Autism category.

To determine the impact of funding on Autism services, we examined special education state funding formulas. Texas used a weighted pupil formula to determine distribution of student funding, with a multiplier used to determine allotment (Heflin & Alaimo, 2007). The multiplier is determined by type (e.g. speech therapy) and location of services (e.g. residential care). As a result, there appeared to be no incentive in terms of funding for students to receive services under the Autism category. We also examined statewide programs to determine if they may influence Autism services and disproportionality. We found that there was a statewide initiative on Autism in Texas (the Texas Council on Autism and Pervasive Developmental Disorders), which was involved with the regulation and administration of services for individuals with Autism. The Council issues a report every two years to identify and address the needs of individuals with Autism ("State Autism Profiles," 2012). Further, the Texas Education Agency (TEA) had twenty regional Autism centers coordinated by the Texas Statewide Leadership for Autism organization to provide training, technical assistance, support, and resources for educators as well as a website that could be accessed by families. There was also an annual Texas State Conference on Autism that was open to parents, educators and professionals. Texas also had a website dedicated to providing families with information and strategies. Texas is home to the Ziggurat Group (Henry & Myles, 2007) developers of the Ziggurat Model which is a well-known text for designing interventions for students with Autism, providing resources, conferences, and assessment materials related to Autism.

Lastly, we examined teacher licensure related to Autism. The state of Texas had a multi-categorical special education credential, with no special requirements for teachers of students with Autism. University programs focusing on Autism existed at the University of Texas at Austin (the Autism Project) which aimed to provide a center of excellence for services, knowledge, and best practices related to living, and working with children with Autism spectrum disorders. A number of universities in Texas offer Graduate Certificates in Autism.

Virginia. Virginia (a state with no disproportionality) is an average population state with demographics similar to national averages (within +/- ten percentage points) for all racial groups (US Census Bureau, 2010).

Table 4

Characteristics of High and Low Prevalence States

State	Autism prevalence	IDEA % Autism	Number of race/ethnic groups indicating disproportionality	Funding incentive?
Iowa	Low	1	1 (Over-Black)	No
Colorado	Low	3	2 (Under-Hispanic; Over-White)	Yes
Louisiana	Low	3	2 (Under-Native American & Black	No
Mississippi	Low	2	0	No
Montana	Low	3	1 (Over-Asian)	No
New Mexico	Low	2	3 (Under-Black; Over-Asian & White)	No
North Dakota	Low	4	3 (Under-Native American; Over-Asian & Black)	No
Connecticut	High	7	0	No
Indiana	High	6	2 (Under-Hispanic; Over-White)	Yes
Maine	High	6	0	No
Minnesota	High	10	0	No
Oregon	High	9	1 (Over-Native American)	No
Rhode Island	High	5	0	No

We found that like Texas, there was no clear funding incentive for an Autism diagnosis in Virginia. Overall prevalence was moderate (7 individuals per 10,000) and 5% of IDEA students receive services under the Autism category. Virginia used a resource-based funding mechanism, so that funds were distributed based upon the projected cost of employing instructional personnel. The number of required positions was projected for each school division by applying the maximum caseload allowed for each disability category to the number of children served as reported on the December special education child count (Ahearn, 2010). At the time of the 2008 Easter Seals report, Virginia did not have an active statewide Autism initiative. However, the state had completed a 2006 initiative that evaluated and sought to improve education and treatment for individuals with Autism Spectrum Disorders, and there was another Autism study to evaluate services and training programs underway ("State Autism Profiles," 2012). Additionally, the Virginia Department of Education had an Autism Priority Project that provided training and technical support to educators of students with Autism via eight regional centers across the state. Virginia had a multi-categorical special education endorsement as part of its teaching licensure, with no special requirements for teachers of students with Autism. However, the Virginia Commonwealth University (VCU) offered a post-baccalaureate Graduate Certificate in Autism Spectrum Disorders to prepare personnel to support individuals with Autism Spectrum Disorders in educational settings from early intervention through adult services. Additionally, VCU housed the Autism Center of Virginia that provided services, trainings, and research in Autism.

Arizona. Arizona (a state with four categories of disproportionality) is an average population state with

demographics similar to the US population, although Arizona has nearly twice as many Hispanics than the national average. Arizona had a moderate prevalence of Autism and 5% of IDEA students received services under the Autism category. Arizona used a weighted formula for distributing special education funding. Students with Autism receive a weight approximately 6 times higher than students not receiving special education services; thus, there is a clear funding incentive for an Autism diagnosis in Arizona (Ahearn, 2010). In 2008, Arizona did not have any statewide initiatives or task forces related to Autism. Arizona offered both cross-categorical and categorical special education teaching certificates in the following areas: "cross-categorical," "early childhood," "hearing impaired," "severely and profoundly disabled," "specialized" (e.g. "mental retardation"), and "visually impaired." It should be noted that these are categories used by the state of Arizona, and do not reflect current best practices in labeling disability. There were neither special requirements nor certifications to teach students with Autism. However, there was a Graduate Certificate in Autism available through a tri-University partnership between the University of Arizona, Arizona State University, and Northern Arizona University. There were no other university programs specifically focused on Autism.

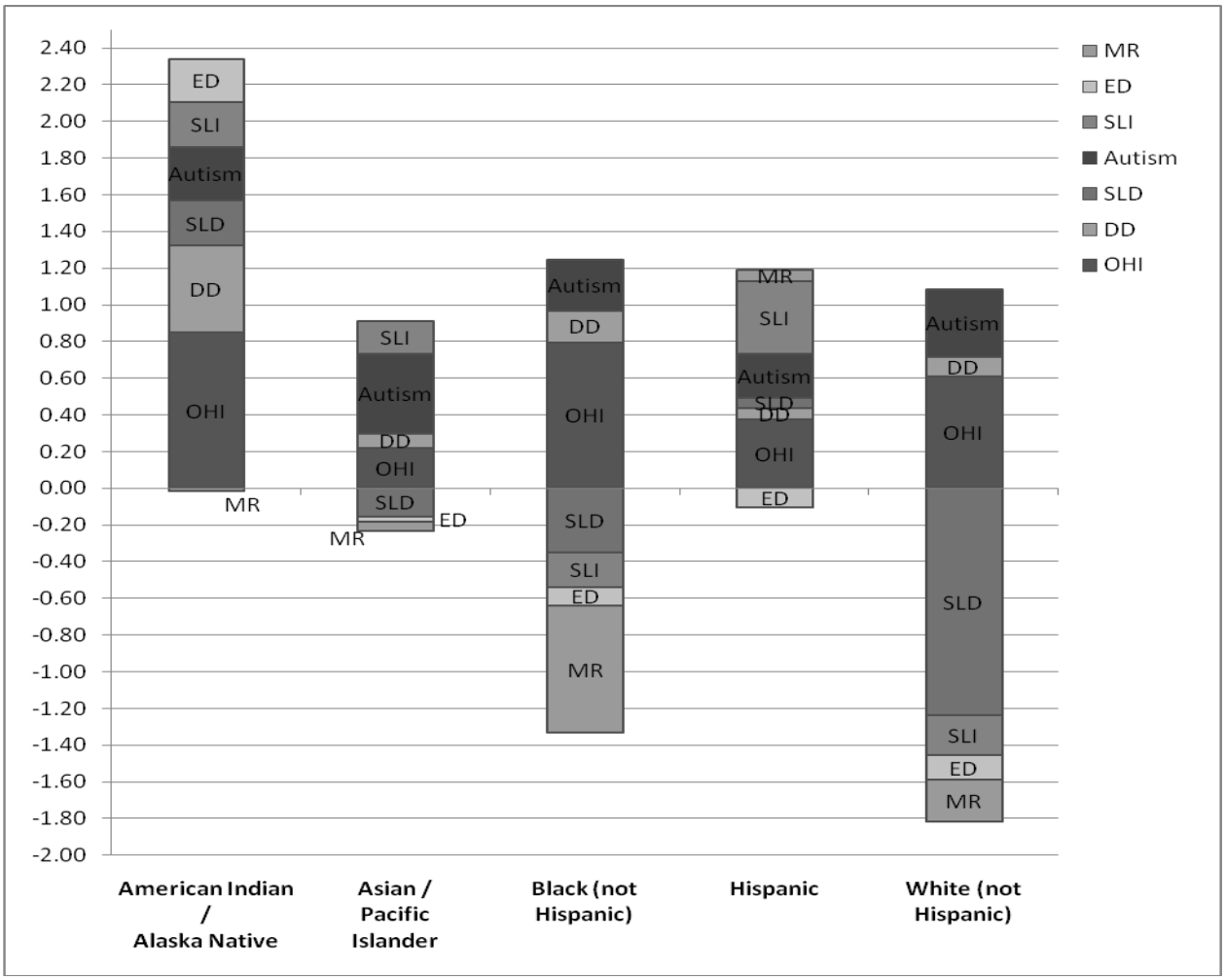
Hawaii. Hawaii (a state with four categories of disproportionality) is a small population state with similar demographics to the US population, although there were more Asian/Pacific Islanders than the US average. Hawaii had a moderate to low prevalence of Autism (4 individuals per 10,000) and 6% of IDEA students received services under the Autism category. Hawaii is unique in that it is one of only a few states with no separate special education funding. Instead, the State Department of Education provides the legislature with a biennial school budget based on demonstrated and expressed need, and the legislature then negotiates funding (Ahearn, 2010). Thus, there is no funding incentive for an educational label of Autism in Hawaii. In 2008, Hawaii convened a temporary (one-year) task force to review benefits and coverage for Autism Spectrum Disorders ("State Autism Profiles," 2012). Hawaii offered a multi-categorical special education teaching credential, as well as certificates in the following areas: "blind/visually impaired," "deaf/hard of hearing," "mild/moderate," "orientation and mobility," "orthopedically handicapped," and "severe/profound." Again, these are terms used by the state of Hawaii and are not reflective of current best practice). There were no special requirements to teach students with Autism, but the University of Hawaii offered a post-baccalaureate certificate in severe disabilities/Autism. There were no other university programs specifically focused on Autism.

Prevalence Trends Amongst Disability Categories by Ethnicity/Race

In order to determine how increased prevalence rates might have been affected by overall special education enrollment, we analyzed changes from 1998-2008 for the prevalence of disability categories and race/ethnicity. An analysis of prevalence trends for total number of students receiving special education services by race/ethnicity showed that there was an increase amongst American Indian/Alaska Native, Asian/Pacific Islander, and Hispanic groups; whereas, there was a slight decrease amongst Black and White groups (see Figure 1). Figure 1 illustrates the disability categories (as defined by IDEA 2004) that increased in prevalence and those that decreased in prevalence for each race/ethnic group. As can be seen, all disability categories increased for the American Indian/Alaska Native group and for all race/ethnic groups, except for Hispanic, the Mental Retardation (MR) category showed a decrease. Interestingly, for all race/ethnic groups, there was a substantial prevalence increase in the categories of "Other Health Impairments" and "Autism."

Limitations

Before discussing the results of our analysis, it is important to note several limitations. An important limitation is that the data reported in this article was gathered through examination of what was available online and the data that was reported to the U.S. Department of Education's Office of Special Education Programs. We did not conduct follow-up interviews to evaluate whether the reported data was accurate. Therefore, our discussion of the data presented must be interpreted with caution. Many states over the past several years have initiated statewide initiatives to meet the ever-increasing numbers of students with an Autism diagnosis. Furthermore, a more detailed look within a selection of states, which was beyond the scope of our analysis, would have allowed for a further examination of the potential reasons for disproportionality amongst various race/ethnic groups. It must also be noted that within-state variations are also very likely and closer examination of these variations would certainly provide useful information. In other words, just because a state's data does not indicate disproportionality, does not necessarily mean that disproportionality does not exist within certain schools and/or districts. Furthermore, we



Note. OHI=Other Health Impairment; DD=Developmental Delay; ED=Emotional Disturbance; SLI=Speech/Language Impairment; SLD=Specific Learning Disability; MR=Mental Retardation. Prevalence rate is calculated by dividing the total number of children served in each race/ethnicity by the total resident population in each race/ethnicity multiplied by 100.
Source: U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB #1820-0043: "Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act," 2008.

Figure 1. Changes in Prevalence of Students Ages 6-21 Receiving Special Education Services Under Selected Disability Categories by Race/Ethnicity (between 1998 and 2008)

were unable to determine how states, school districts, or schools determine Autism diagnoses. Specifically, the diagnostic tools used by various states, districts, and schools are unknown. It is possible that variation in diagnostic procedures and tools could contribute to disproportionality. Again, this type of detailed analysis was beyond the scope of our analysis but does warrant further investigation.

Discussion

Results from our examination of the IDEA data, the NASDSE report, and Easter Seals report, confirms what others have also found: prevalence of Autism has increased, prevalence rates vary by race/ethnicity, and there is great variability across geographic regions. A review of disproportionality based on race/ethnicity reveals that generally, White and Asian/Pacific Islander students tend to be over-represented in the Autism category, whereas Black, Hispanic, and American Indian/Alaska Native students tend to be under-represented in the Autism category. A number of speculations have been presented to explain these differences in Autism diagnosis amongst race/ethnic groups, including differences in populations, the effects of geography, access to health care, cultural effects, and parent age.

One potential factor contributing to greater

disproportionality amongst race/ethnicity is overall prevalence of Autism. We speculate that the higher the prevalence rate, the less disproportionality there is, since there would likely be statewide efforts resulting in greater awareness of Autism; hence, a higher overall prevalence along with less disproportionality based on race/ethnicity. Our examination of high and low prevalence states appeared to confirm this. High prevalence states tended to have lower disproportionality and low prevalence states tended to have greater disproportionality. In addition, higher prevalence rates could be associated with characteristics of the local community. For example, a University of California, Davis MIND Institute study found that "clusters" of Autism were associated with higher income, parental education, and proximity to Autism treatment centers ("Autism Clusters Identified in California," 2010). These findings suggest that individuals who reside in areas with greater access to services, and likely have greater access to health care, may have a better chance of obtaining an Autism diagnosis than those who live in more rural areas or have less access to health care. Our analysis suggest that the more rural states tended to have overall lower prevalence of Autism, which might explain the greater disproportionality associated with low prevalence states.

Along with the increasing prevalence of Autism across the five race/ethnicity groups, we found continued presence of disproportionality across states. The data suggest some minimal improvements with reduction of over- or under-representation of students with autism in specific race/ethnicity categories across states between 2004 and 2008.

A number of factors have been suggested in the literature to increase the chances of an Autism diagnosis which could result in either disproportionality and/or higher prevalence rates. A few of these factors include higher per-pupil expenditures (Goldstein, Johnson, & Minshew, 2001), membership in a majority racial/ethnic group (Begeer, El Bouk, Boussaid, Terwogt, & Koot, 2009), proximity to other children with Autism (Liu, King, & Bearman, 2010), and parental education and proximity to Autism treatment centers ("Autism Clusters Identified in California," 2010).

Implications for Policy and Practice

Autism is a diagnosis that is based on observable behaviors as described in the *DSM-IV-TR*. Therefore, it is not surprising that there is wide variability with which Autism is diagnosed, resulting in the wide variability in prevalence across states. While variability in the prevalence of autism is likely to result from a variety of factors, we believe that the effects of this variability, and resulting disproportionality, need to be examined and understood. First, the under-representation of specific race/ethnic groups suggests that certain children are not receiving an Autism diagnosis although they may in fact have Autism is an area of concern. The presence of an Autism diagnosis affords children access to services and treatments necessary for positive outcomes. In fact, access to these services is highly sought after amongst parents from higher SES backgrounds. Early intervention services are especially sought after, because early comprehensive intervention services are critical to future skill improvement. Second, presence of over-representation of Autism might suggest that factors other than meeting diagnostic criteria are determining diagnoses for Autism, including urbanicity (e.g. Rosenberg, 2009) , and the effects of language and culture (e.g. Jegatheesan, 2009).

An interesting note is that although we did not examine all statewide activities or certification requirements, amongst the four that we did examine, none had a specific state requirement for teachers working with students with Autism. However, each state did have universities that offered graduate certificate programs specific to Autism. This could imply that certification requirements specific for teaching children with Autism may not be important. However, this requires further investigation.

In conclusion, a major question of policymakers and educators is whether disproportionality of Autism based on race/ethnicity is an important issue to address. We believe it is, if a diagnosis of Autism is associated with specialized services and/or access to greater resources. In addition, it would be of great interest to explore the possibility of this trend occurring in countries worldwide.

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